Private Cloud : Technology and Deployment

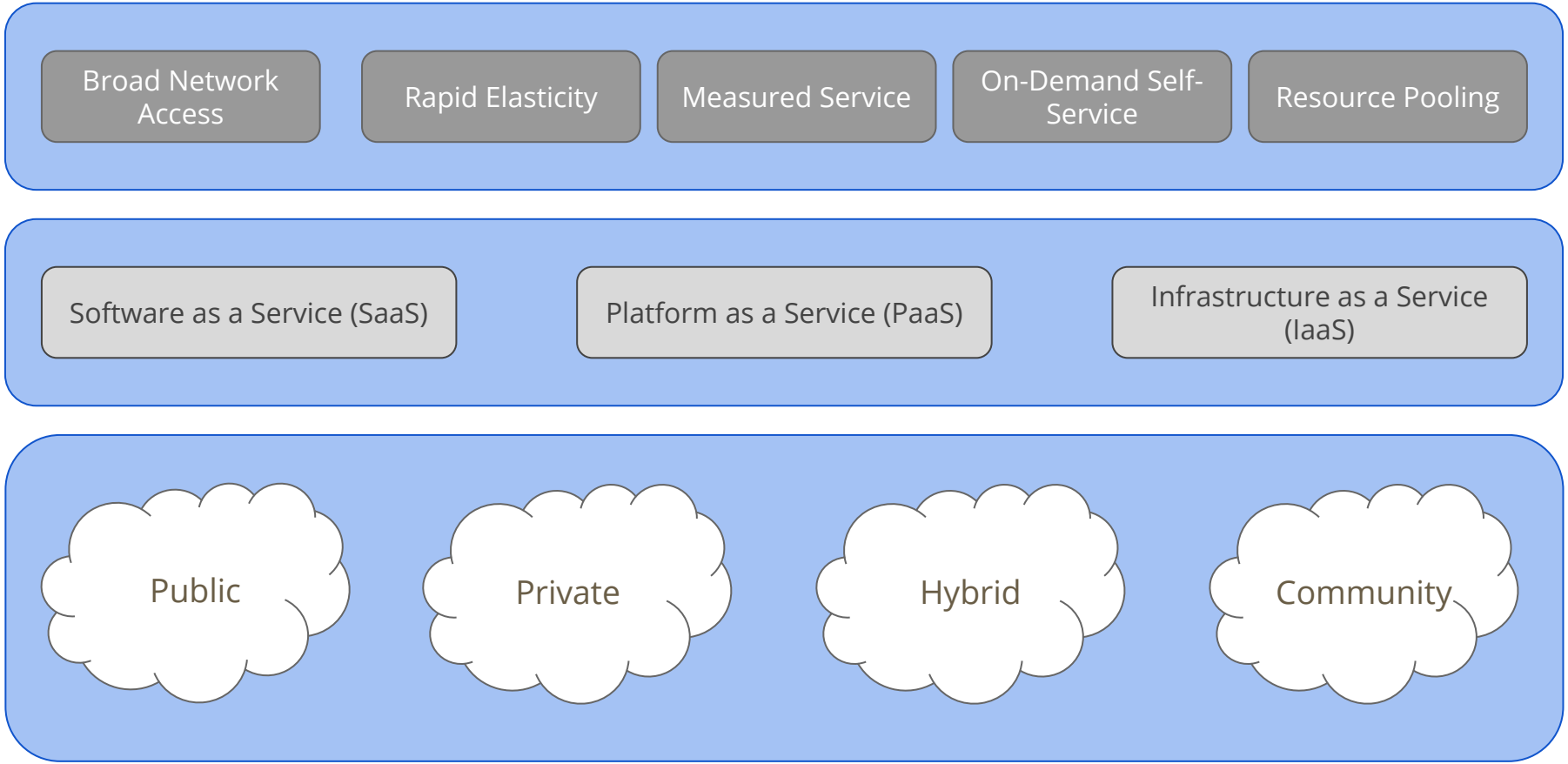
Table of Contents

1. Introduction
2. Private Cloud
3. Setup of a Private Cloud
4. Security Issues
5. Pros and Cons
6. Discussion

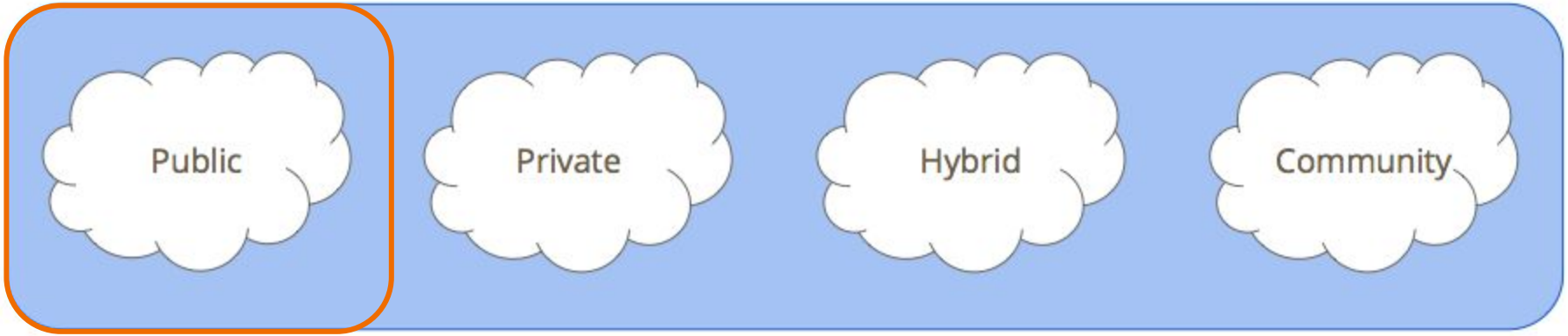
What is Cloud Computing?

Definition of National Institute of Standard and Technology:

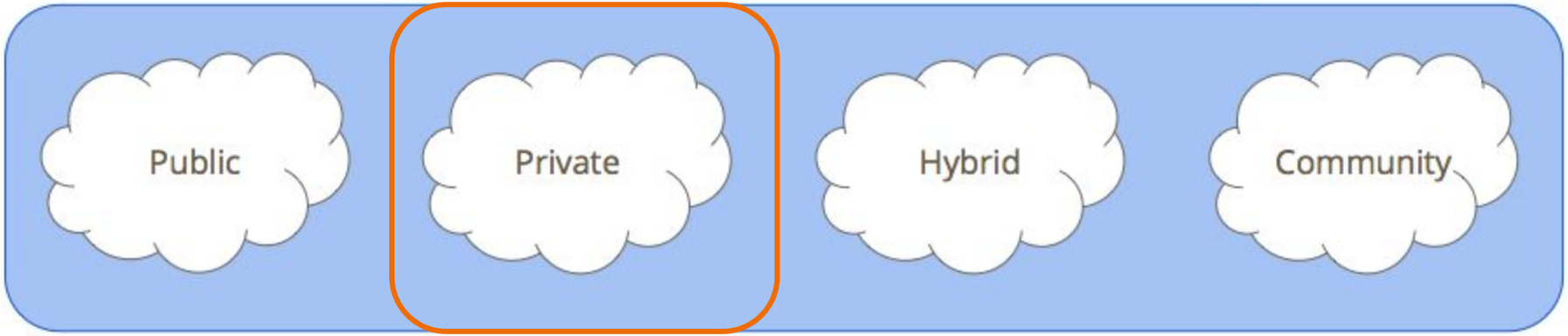
“Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of **five essential characteristics**, **three service models** and **four deployment models**.”



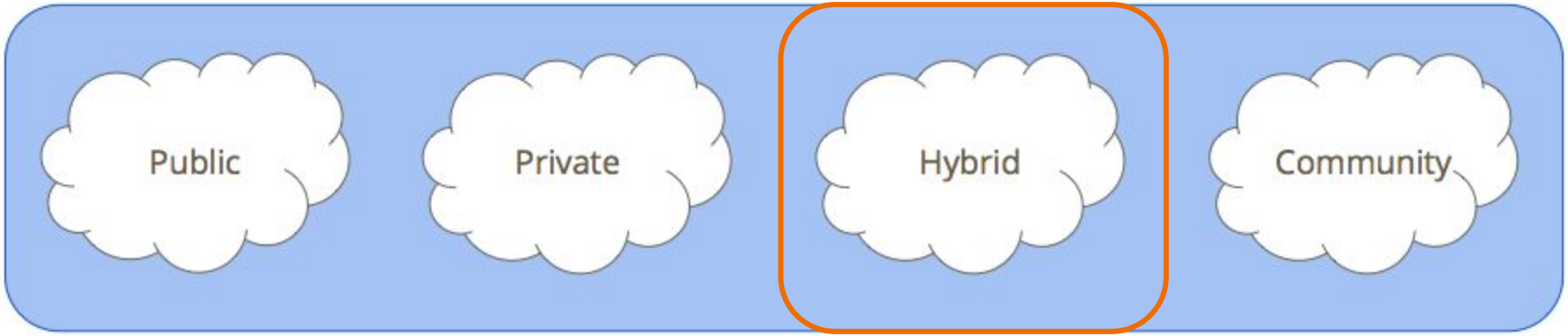
source: https://www.simple-talk.com/cloud/development/private-cloud,-what-is-it-and-why-do-you-need-it/



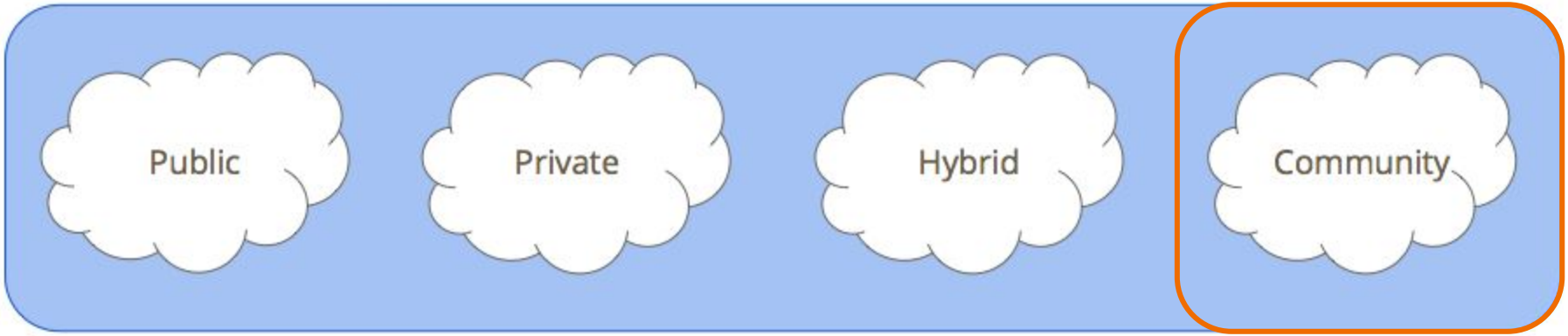
- “pay-as-you-go”
- No need to buy hardware to use the services
- All customers share the same infrastructure pool
- Hosted away from premises
- Owned by a third party organization



- Hosted on premise
- Is dedicated to a single organization or a group of people
- Can only be accessed by members of the organization
- Not shared with others
- Expensive

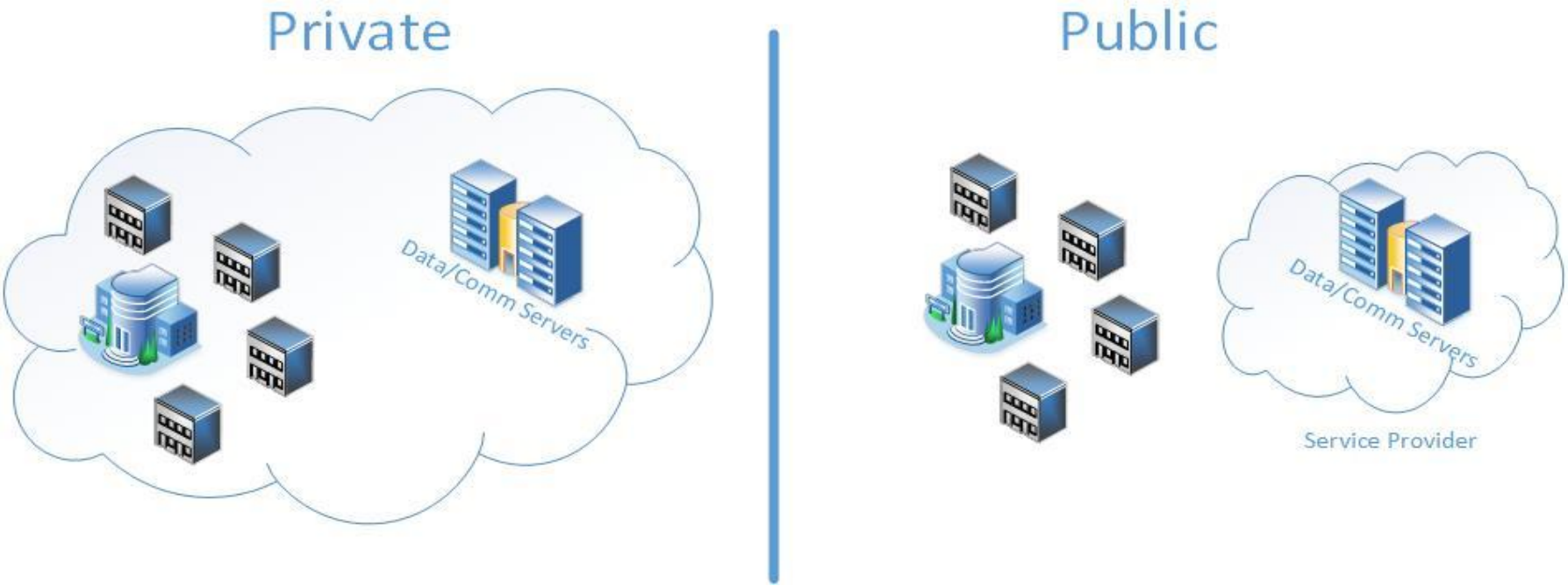


- Combination of private and public cloud
- Host sensitive data on the private cloud
- Host insensitive data on the public cloud



- Organization share one infrastructure
- Data centers can be on or off premise
- Example: Cloud for government authorities

Private Cloud



source:http://blog.inin.com/how-to-compare-the-private-and-public-cloud/

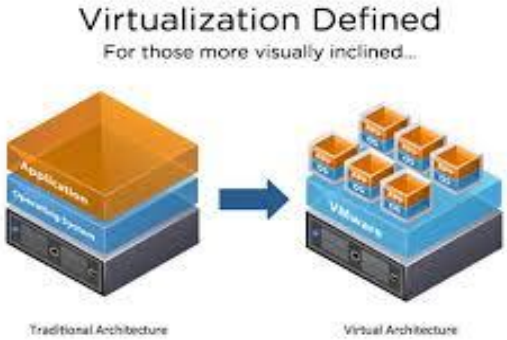
Home Cloud

source: http://www.hightech-highway.com/wp-content/uploads/2013/06/cloud-computing.jpg

Storage Versus Cloud Computing

source:https://gigaom.com/2014/03/01/how-to-set-up-your-own-personal-home-cloud-storage-system/
source:http://www.featurepics.com/online/Laptop-Computer-External-Hard-Drive-784924.aspx

Cloud Computing



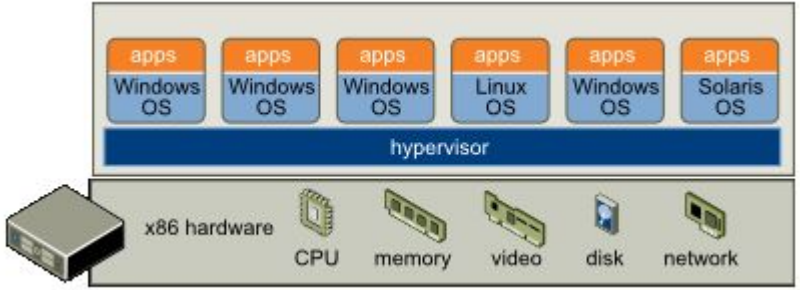
cloudstack
open source cloud computing

openstack
CLOUD SOFTWARE

source:http://vmturbo.com/about-virtualization/the-curious-case-of-the-escaping-virtual-machine/
source:https://en.wikipedia.org/wiki/OpenStack
source:http://www.severalnines.com/blog/how-deploy-high-availability-cloudstackcloudplatform-mariadb-galera-cluster

Virtualization

Separation of servers, storages, and network resources from the physical environment to run multiple Operating Systems



source: http://blog.silver-peak.com/virtualization-101

Virtualization vs Cloud Computing

- Virtualization is an integral part of cloud computing
- It does not imply cloud computing
- It supports cloud computing to manage computer resources effectively

Types of Virtualization

- Full Virtualization

  guest operating system is unaware that it is in a virtualized environment

- Para virtualization

  allows multiple operating systems to run on hardware at the same time, example KVM

- System level virtualization (OS)

  virtualization capability is part of the host OS, which performs all the functions of a fully virtualized hypervisor

Virtualization vs Cloud Computing

Why KVM (Kernel-based Virtual Machine) and Paravirtualization

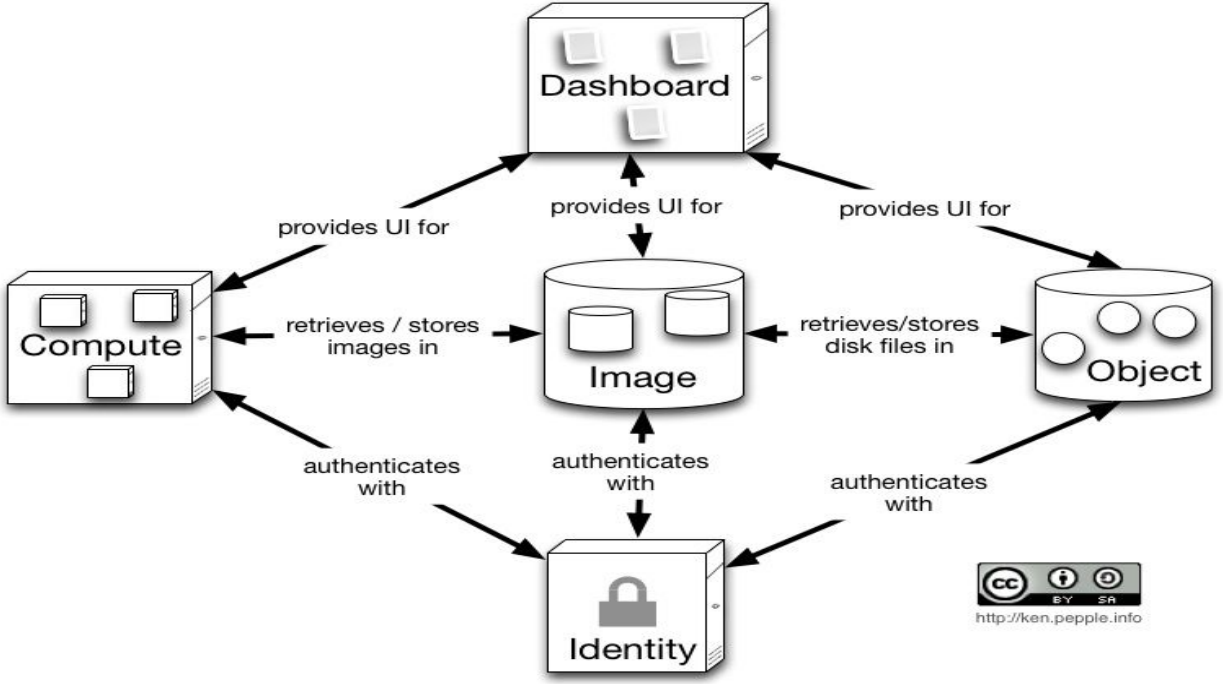
is linked to Cloud Computing

- Leading open source for complete virtualization solution on x86 hardware
- Supports all major operating systems including Linux
- The guest servers in a para-virtualization system are aware of one another
- Para-virtualization hypervisor doesn't need as much processing power to manage the guest operating systems
- KVM only works if your CPU has hardware virtualization support

OpenStack Components

- Compute Service Known as Nova
- Image Service known as Glance
- Identity Service known as Keystone
- Network Service known as Quantum
- Object Storage known as Swift
- Dashboard Service known as Horizon

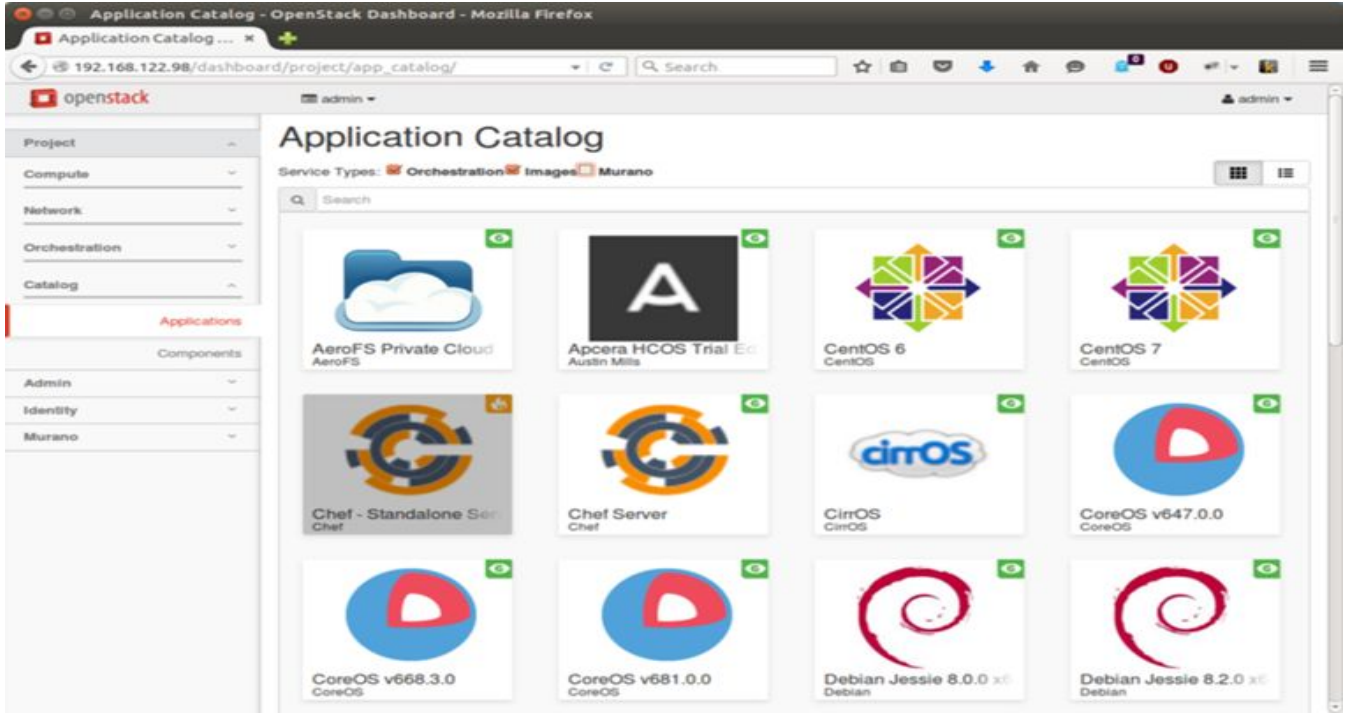
OpenStack Conceptual Architecture



OpenStack Details

- Multi-tenant, massively scalable, open source cloud operating system.
- Supports various hypervisors, including: Xen/XenServer , KVM, Hyper-V, VMWare/ESX, Linux Containers (LXC), QEMU, UML
- Flexible network and storage options
- Apache 2.0 open source license

Community Application Catalog



source: OpenStack

Limitations of OpenStack

- Challenging installation
- Many nodes for each service
- Traditional Network Solutions have interfaces

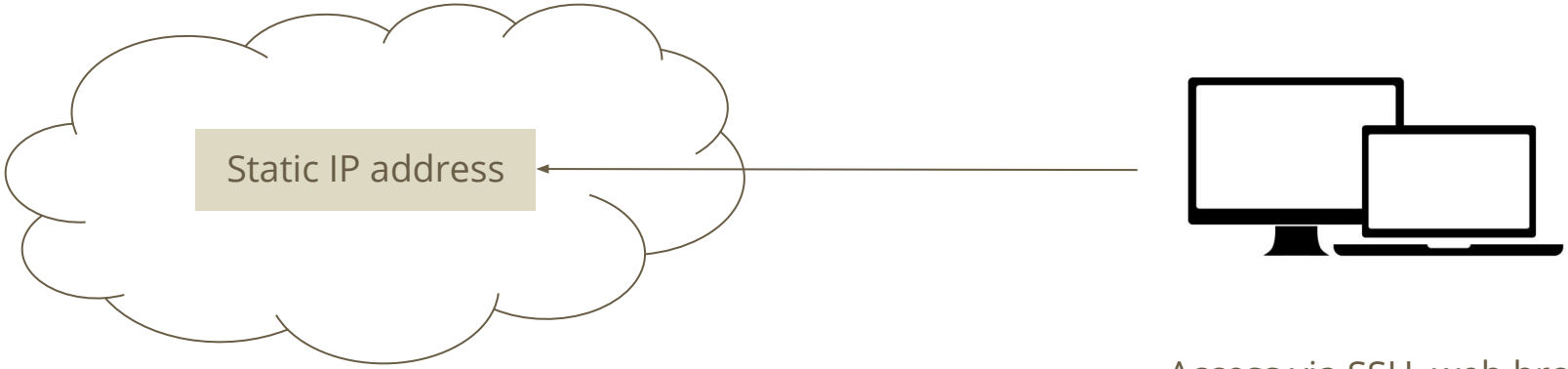
Cloud Marketplace	AppDirect, APPIRIO, INGRAM MICRO Partner Smart, myGravitant, ...
Cloud Broker Platform	cloudMatrix™, jamcracker, ...
Cloud Management	apptio, cloudability, CLOUDSWITCH, Cloudyn, Gravitant The Power to Transform, LTECH, RIGHTSCALE, ...
SaaS	Google Apps, NETSUITE, salesforce, Taleo, ...
PaaS	Azure, force.com platform as a service, Google, heroku, ...
IaaS	amazon web services, GOGRID, Joyent, rackspace, SAVVIS, terremark, ...
Cloud Platform	cloudstack open source cloud computing, cloud.com, ElasticStack Powering your own-brand cloud, enomaly, Eucalyptus, flexiant, onapp, openstack, vmware vCLOUD, ...
Virtualization Software/Mgmt	Parallels, Virtualiron, Virtuozzo, vmware, Xen / CITRIX XenServer, Hyper-V, KVM, vSphere, ...
Hardware	IBM BladeCenter®, DELL PowerEdge Blade Servers, ORACLE Sun Blade, hp BladeSystem, ...

source: http://blog.gravitant.com/2012/07/27/cloud-technology-spectrum/#!prettyPhoto/1/

How to Reach Your Home cloud?

- Renting static IP
- Renting static IP + Domain name
- Renting subdomain of DDNS provider

Renting Static IP



Access via SSH, web browser or other clients

Providers:

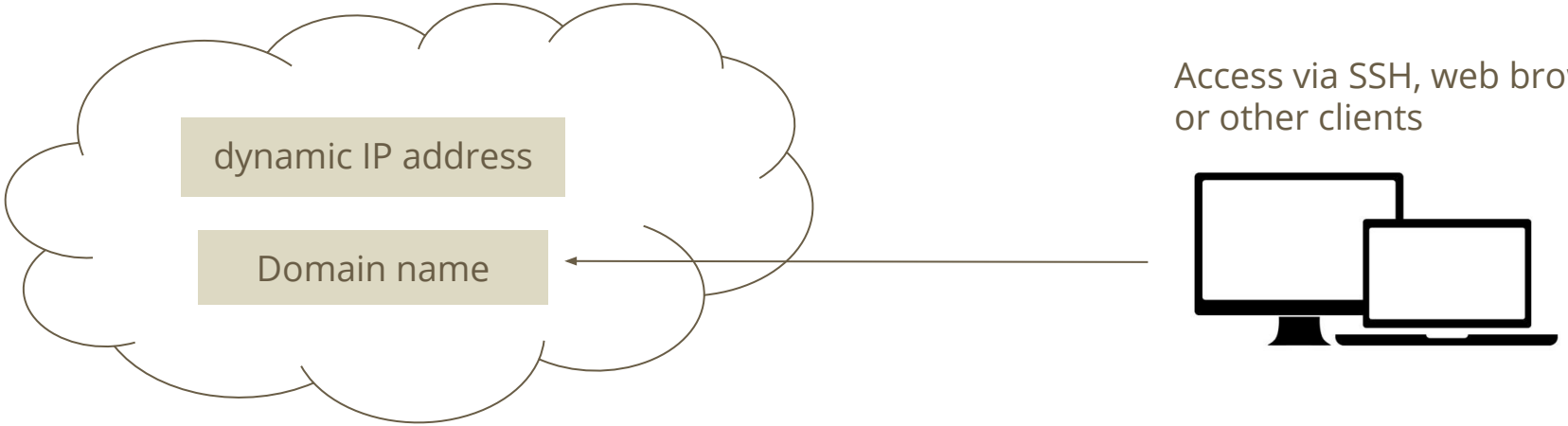
- Swisscom
- Init7

Renting Static IP + Domain Name

Domain name registrar:

- Switch Plus

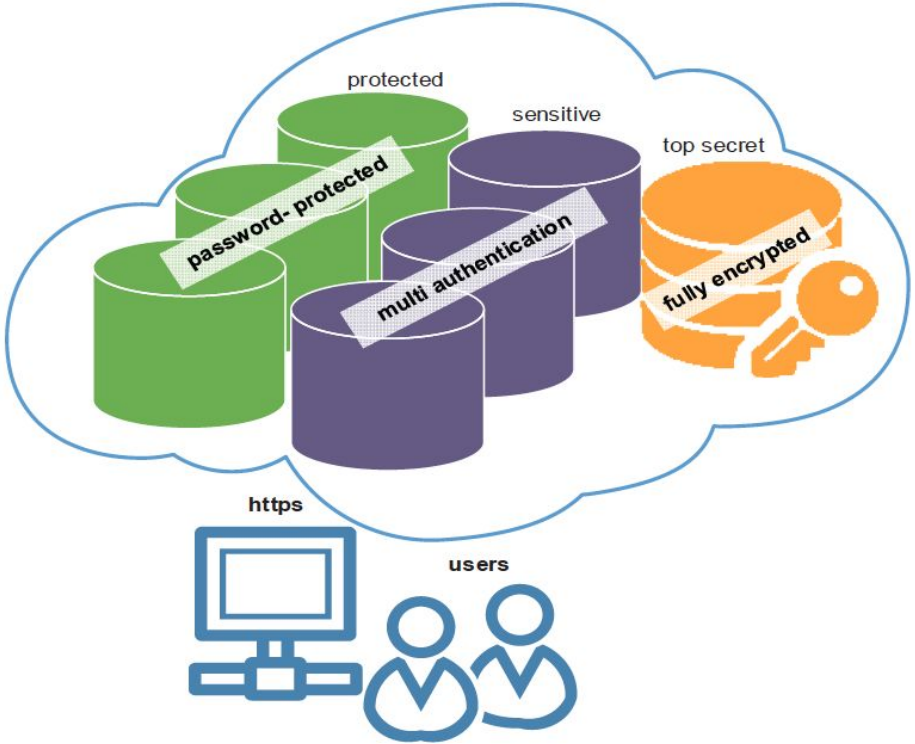
Renting Subdomain of DDNS Provider



Provider for DDNS:

- Dyn.com
- NoIP.com

Security Protection Levels



source: F. Yahya, R. J. Walters, G. B. Wills, “Protecting Data in Personal Cloud Storage with Security Classifications”, Science and Information Conference 2015, London UK

Security Levels

Security Level	Authentication	Encryption
Protected	Single Factor	SSL, 256-bits AES
Sensitive	Multi-Factor	SSL, 256-bits AES
Top Secret	Multi-Factor	SSL, 256-bits AES, RSA, Filename Encryption

source: F. Yahya, R. J. Walters, G. B. Wills, “Protecting Data in Personal Cloud Storage with Security Classifications”, Science and Information Conference 2015, London UK

Security Risks

- Privileged user access
- Data location and segregation
- Data disposal
- e-investigations and protective monitoring
- Assuring cloud security

Pros and Cons of Home Cloud

Pros	Cons
Configuration	Network Dependence
File Sharing	Quality of Service
Security	Security Issues
Online backup	Quality of experience

Questions?

Discussions

Which type of cloud would you prefer now?

Where do you see a use for a public cloud and where for a private cloud?

Why do you think home clouds are not more frequent?

Why haven’t you set up a home cloud yet?

Thank you!